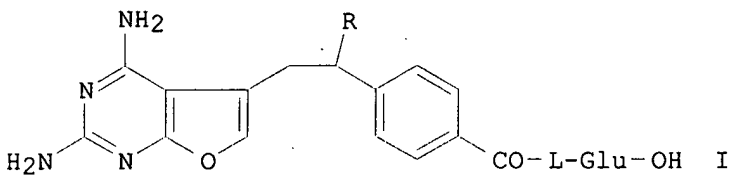
=> d ibib abs hitstr 1-6

L17 ANSWER 1 OF 6 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2002:212209 HCAPLUS
DOCUMENT NUMBER: 136:386368
TITLE: Synthesis of N-[4-[1-Ethyl-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethyl]benzoyl]-L-glutamic Acid as an Antifolate
AUTHOR(S): Gangjee, Aleem; Zeng, Yibin; McGuire, John J.; Kisliuk, Roy L.
CORPORATE SOURCE: Division of Medicinal Chemistry, Graduate School of Pharmaceutical Sciences, Duquesne University, Pittsburgh, PA, 15282, USA
SOURCE: Journal of Medicinal Chemistry (2002), 45(9), 1942-1948
CODEN: JMCMAR; ISSN: 0022-2623
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English
GI



I

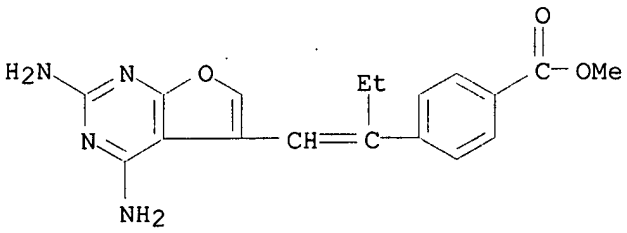
AB N-[4-[1-Ethyl-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethyl]benzoyl]-L-glutamic acid (3), I (R = Et), was designed and synthesized to investigate the effect of homologation of a C9-Me to an Et on dihydrofolate reductase (DHFR) inhibition and on antitumor activity. Compd. 3 was obtained via a concise seven step synthesis starting from palladium-catalyzed carbonylation of 4-propionylphenol, followed by a Wittig reaction with 2,4-diamino-5-(chloromethyl)furo[2,3-d]pyrimidine, catalytic hydrogenation, hydrolysis, and std. peptide coupling with di-Et L-glutamate. The biol. results indicated that extending the C9-Me group to an Et on the C8-C9 bridge region for compd. 3 doubled its inhibitory potency against recombinant human (rh) DHFR (IC50 = 0.21 .mu.M) as compared to the C9-Me analog 1, I (R = Me), and was 4-fold more potent than the C9-H analog 2, I (R = H). As compared to 1, compd. 3 demonstrated increased growth inhibitory potency against several human tumor cell lines in culture with GI50 values < 1.0 .times. 10-8 M. Compd. 3 was also a weak inhibitor of rh thymidylate synthase. Compds. 1 and 3 were efficient substrates of human folylpolyglutamate synthetase (FPGS). Further evaluation of the cytotoxicity of 3 in methotrexate-resistant CCRF-CEM cell sublines and metabolite protection studies implicated DHFR as the primary intracellular target. Thus, alkylation of the C9 position in the C8-C9 bridge of the classical 5-substituted 2,4-diaminofuro[2,3-d]pyrimidine is highly conducive to DHFR and tumor inhibitory activity as well as FPGS substrate efficiency.

IT **425663-97-4P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(prepn., antitumor and enzyme inhibitory activities of

[ethyl(diaminofuro[2,3-d]pyrimidinylethyl)benzoyl]glutamate as an antifolate)

RN 425663-97-4 HCAPLUS

CN Benzoic acid, 4-[1-[(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)methylene]propyl]-, methyl ester (9CI) (CA INDEX NAME)



REFERENCE COUNT: 35 THERE ARE 35 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 2 OF 6 HCAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2000:455707 HCAPLUS

DOCUMENT NUMBER: 133:232432

TITLE: Effect of C9-Methyl Substitution and C8-C9 Conformational Restriction on Antifolate and Antitumor Activity of Classical 5-Substituted 2,4-Diaminofuro[2,3-d]pyrimidines

AUTHOR(S): Gangjee, Aleem; Zeng, Yibin; McGuire, John J.; Kisliuk, Roy L.

CORPORATE SOURCE: Division of Medicinal Chemistry Graduate School of Pharmaceutical Sciences, Duquesne University, Pittsburgh, PA, 15282, USA

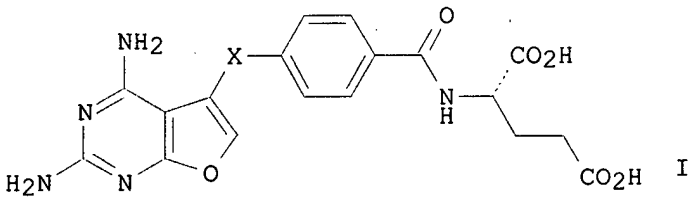
SOURCE: Journal of Medicinal Chemistry (2000), 43(16), 3125-3133
CODEN: JMCMAR; ISSN: 0022-2623

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

GI



AB Diaminofuro[2,3-d]pyrimidinylethylbenzoyl-L-glutamic acid I [X = CH2CH(Me)] and its C8-C9 conformationally restricted E- and Z-isomers I [X = (Z)- and (E)-CH:C(Me)] were designed and synthesized in order to investigate the effect of incorporating a Me group at the C9 position and of conformational restriction at the C8-C9 bridge of I (X = CH2CH2) with respect to dihydrofolate reductase (DHFR) inhibitory activity as well as antitumor activity. The compds. were synthesized by a Wittig reaction of 2,4-diamino-5-(chloromethyl)furo[2,3-d]pyrimidine with Et 4-acetylbenzoate followed by catalytic redn., hydrolysis, and std. peptide coupling with

di-Et L-glutamate. The biol. results indicated that the addn. of a 9-Me group to the C8-C9 bridge, as in I [X = CH2CH(Me)], increased recombinant human (rh) DHFR inhibitory potency (IC50 = 0.42 .mu.M) as well as the potency against the growth inhibition of tumor cells in culture (CCRF-CEM EC50 = 29 nM, A253 EC50 = 28.5 nM, and FaDu EC50 = 17.5 nM) compared with I (X = CH2CH2). However, the conformationally restricted 4:1 Z/E mixt. of I [X = CH:C(Me)] was less potent than I [X = CH2CH(Me)] in both assays, and the pure E-isomer I [X = CH:C(Me)] was essentially inactive. These three classical analogs were also evaluated as inhibitors of Lactobacillus casei, Escherichia coli, and rat and recombinant human thymidylate synthase (TS) and were found to be weak inhibitors. I [X = CH2CH(Me), (Z)- and (E)-CH:C(Me)] were good substrates for human folylpolyglutamate synthetase (FPGS). These data suggested that FPGS is relatively tolerant to different conformations in the bridge region. Further evaluation of the cytotoxicity of I [X = CH2CH(Me), (Z)--CH:C(Me)] in methotrexate (MTX)-resistant CCRF-CEM cell sublines suggested that polyglutamylation was crucial for their mechanism of action. Metabolite protection studies of I [X = CH2CH(Me)] implicated DHFR as the primary intracellular target. I [X = CH2CH(Me)] showed GI50 values in 10-9-10-7 M range against more than 30 tumor cell lines in culture.

IT **292632-59-8P 292632-65-6P**

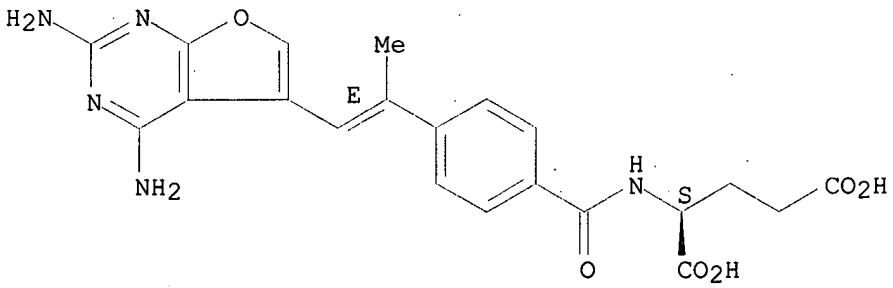
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation)

(prepn. of diaminofuropyrimidine derivs. with methyl-substituted alkane and alkene linkers and their anticancer activity and thymidylate and folylpolyglutamate synthase inhibition)

RN 292632-59-8 HCAPLUS

CN L-Glutamic acid, N-[4-[(1E)-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)-1-methylethenyl]benzoyl]-, monohydrochloride (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.

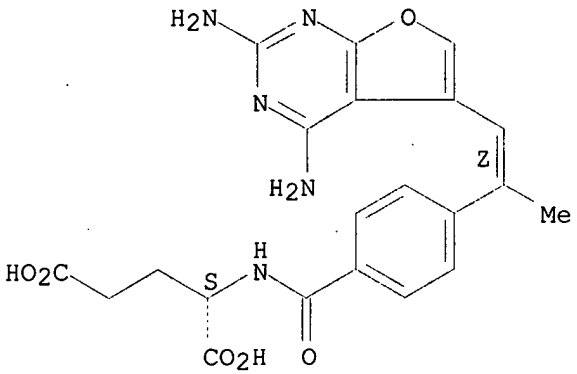


● HCl

RN 292632-65-6 HCAPLUS

CN L-Glutamic acid, N-[4-[(1Z)-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)-1-methylethenyl]benzoyl]-, hydrochloride (2:3) (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.

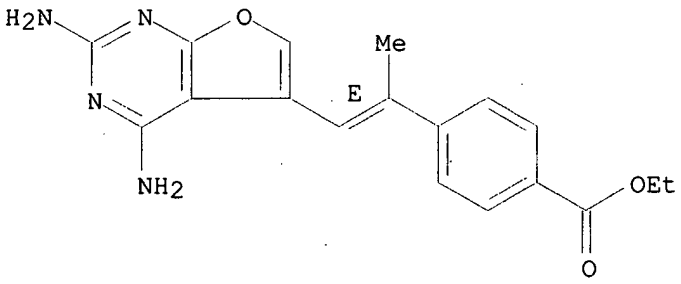


●3/2 HCl

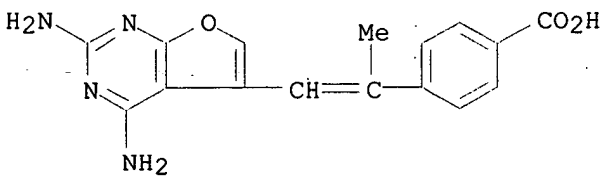
IT **292632-41-8P 292632-55-4P 292632-57-6P**
292632-62-3P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(prepn. of diaminofuropyrimidine derivs. with methyl-substituted alkane and alkene linkers and their anticancer activity and thymidylate and folylpolyglutamate synthase inhibition)

RN 292632-41-8 HCAPLUS
CN Benzoic acid, 4-[(1E)-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)-1-methylethenyl]-, ethyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.



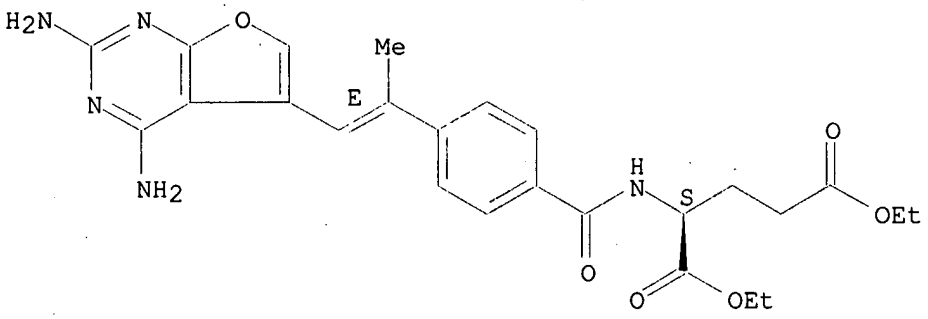
RN 292632-55-4 HCAPLUS
CN Benzoic acid, 4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)-1-methylethenyl]- (9CI) (CA INDEX NAME)



RN 292632-57-6 HCAPLUS
CN L-Glutamic acid, N-[4-[(1E)-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)-1-

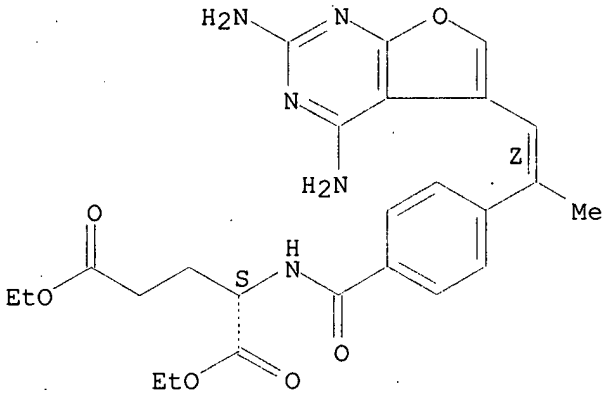
methylethenyl]benzoyl]-, diethyl ester (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



RN 292632-62-3 HCAPLUS
CN L-Glutamic acid, N-[4-[(1Z)-2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)-1-methylethenyl]benzoyl]-, diethyl ester (9CI) (CA INDEX NAME)

Absolute stereochemistry.
Double bond geometry as shown.



REFERENCE COUNT: 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 3 OF 6 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1999:622283 HCAPLUS
DOCUMENT NUMBER: 131:243279
TITLE: Preparation of pyrrolopyrimidines, furopyrimidines, pyridopyrimidines, and related compounds as inhibitors of dihydrofolate reductase and thymidylate synthase.
INVENTOR(S): Gangjee, Aleem
PATENT ASSIGNEE(S): Duquesne University of the Holy Ghost, USA
SOURCE: U.S., 60 pp., Cont.-in-part of U.S. 5,877,178.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 5
PATENT INFORMATION:

PATENT NO. KIND DATE APPLICATION NO. DATE

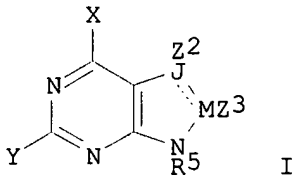
US 5958930	A	19990928	US 1998-73593	19980506
US 5346900	A	19940913	US 1992-950982	19920923
US 5508281	A	19960416	US 1994-304044	19940912
US 5736547	A	19980407	US 1995-515491	19950815
US 5939420	A	19990817	US 1996-660023	19960606
US 5877178	A	19990302	US 1996-683869	19960719
US 2002052384	A1	20020502	US 2001-803510	20010309
US 6537999	B2	20030325		

PRIORITY APPLN. INFO.:

US 1991-682043 B1 19910408
US 1992-829519 B2 19920131
US 1992-950982 A2 19920923
US 1994-304044 A3 19940912
US 1995-515491 A2 19950815
US 1996-660023 A2 19960606
US 1996-683869 A2 19960719
US 1998-73593 A2 19980506
US 1998-190374 A1 19981112
US 1999-315762 A3 19990520

OTHER SOURCE(S): MARPAT 131:243279

GI



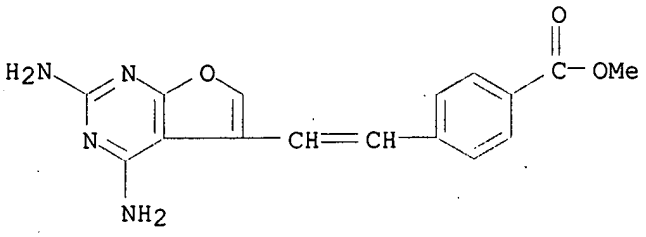
I

AB Title compds. [I; X, Y = OH, NH2, H, Me; L, M = C, CH; dotted line = optional double bond; Z2 = AR3BR1R8, Z3 = R4, or vice versa; A = CH, null; B = CH, N, NCH2, CH2CH2, O, S, SO, SO2; R1 = H, alkyl, nitroso, CHO, null; R3 = H, alkyl, null; R4, R5 = H, alkyl; R8 = (substituted) Ph, naphthyl, thionaphthyl, thiophenyl, hydroxyphenyl, pyridyl, p-aroyl-L-glutamate, etc.; with provisos], were prepd. Thus, N-[4-[N-1-(2,4-diaminopyrrolo[2,3-d]pyrimidin-5-yl)methylamino]benzoyl]-L-glutamic acid [prepn. via 2,4-diamino-pyrrolo[2,3-d]pyrimidine-5-carboxaldehyde given] inhibited dihydrofolate reductase with IC50 = 0.038 .mu.M.

IT **169783-32-8**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(prepn. of pyrrolopyrimidines, furopyrimidines, pyridopyrimidines, and related compds. as inhibitors of dihydrofolate reductase and thymidylate synthase)

RN 169783-32-8 HCAPLUS

CN Benzoic acid, 4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethenyl]-, methyl ester (9CI) (CA INDEX NAME)



REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

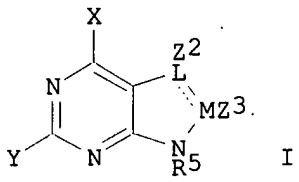
L17 ANSWER 4 OF 6 HCAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 1999:518289 HCAPLUS
DOCUMENT NUMBER: 131:157766
TITLE: Preparation of pyrrolo[2,3-d]pyrimidines, furo[2,3-d]pyrimidines, and related compounds as dihydrofolate reductase inhibitors.
INVENTOR(S): Gangjee, Aleem
PATENT ASSIGNEE(S): Duquesne University of the Holy Ghost, USA
SOURCE: U.S., 34 pp., Cont.-in-part of U.S. 5,736,547.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 5
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5939420	A	19990817	US 1996-660023	19960606
US 5346900	A	19940913	US 1992-950982	19920923
US 5508281	A	19960416	US 1994-304044	19940912
US 5736547	A	19980407	US 1995-515491	19950815
US 5877178	A	19990302	US 1996-683869	19960719
US 5863920	A	19990126	US 1997-925839	19970908
US 5958930	A	19990928	US 1998-73593	19980506
US 6096750	A	20000801	US 1998-190374	19981112
US 6077844	A	20000620	US 1999-263676	19990305
US 6103727	A	20000815	US 1999-435401	19991105
US 6221872	B1	20010424	US 2000-565130	20000504
US 6420370	B1	20020716	US 2000-603664	20000623
US 6518426	B1	20030211	US 2000-689544	20001012
US 2002052384	A1	20020502	US 2001-803510	20010309
US 6537999	B2	20030325		

PRIORITY APPLN. INFO.:
US 1991-682043 B1 19910408
US 1992-829519 B1 19920131
US 1992-950982 A2 19920923
US 1994-304044 A3 19940912
US 1995-515491 A2 19950815
US 1996-660023 A2 19960606
US 1996-683869 A2 19960719
US 1998-73593 A2 19980506
US 1998-190374 A3 19981112
US 1999-263676 A3 19990305
US 1999-315762 A3 19990520
US 1999-435401 A3 19991105
US 2000-565130 A3 20000504

OTHER SOURCE(S): MARPAT 131:157766

GI



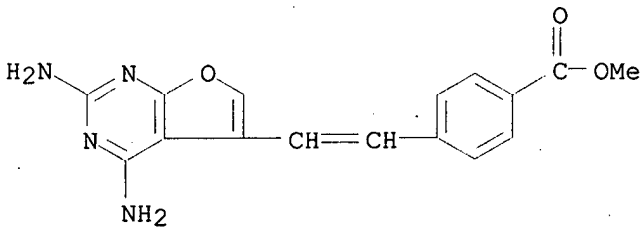
I

AB Title compds. [I; X, Y = OH, NH2; L, M = C, CH; Z2, Z3 are different and = R4, R3ABR1R8; A = CH, null; B = CH, N, NCH2, CH2CH2, O, S; R3 = H, alkyl, null; R4, R5 = H, alkyl; R8 = (substituted) Ph, naphthyl, thionaphthyl, thiophenyl, hydroxyphenyl, pyridyl, aroylglutamate; with provisos], were prepd. Thus, 4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethyl]benzoic acid (prepn. given) in DMF was treated sequentially with Et3N, iso-Bu chloroformate, di-Et L-glutamate, and Et3N to give a residue which was stirred with aq. NaOH in MeOH to give N-[4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethyl]benzoyl]-L-glutamic acid. This inhibited growth of CCRF-CEM cells with EC50 = 0.29 .mu.M.

IT **169783-32-8P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(prepn. of pyrrolo[2,3-d]pyrimidines, furo[2,3-d]pyrimidines, and related compds. as dihydrofolate reductase inhibitors)

RN 169783-32-8 HCAPLUS

CN Benzoic acid, 4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethenyl]-, methyl ester (9CI) (CA INDEX NAME)



REFERENCE COUNT: 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 5 OF 6 HCAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 1999:152290 HCAPLUS
DOCUMENT NUMBER: 130:218324
TITLE: Pyrimidine derivatives, preparation, and therapeutic use
INVENTOR(S): Gangjee, Aleem
PATENT ASSIGNEE(S): Duquesne University of the Holy Ghost, USA
SOURCE: U.S., 49 pp., Cont.-in-part of U.S. Ser. No. 660,023.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 5
PATENT INFORMATION:

PATENT NO. KIND DATE APPLICATION NO. DATE

US 5877178	A	19990302	US 1996-683869	19960719
US 5346900	A	19940913	US 1992-950982	19920923
US 5508281	A	19960416	US 1994-304044	19940912
US 5736547	A	19980407	US 1995-515491	19950815
US 5939420	A	19990817	US 1996-660023	19960606
US 5958930	A	19990928	US 1998-73593	19980506
US 6096750	A	20000801	US 1998-190374	19981112
US 6103727	A	20000815	US 1999-435401	19991105
US 6420370	B1	20020716	US 2000-603664	20000623

PRIORITY APPLN. INFO.:
US 1991-682043 B1 19910408
US 1992-829519 B1 19920131
US 1992-950982 A2 19920923
US 1994-304044 A3 19940912
US 1995-515491 A2 19950815
US 1996-660023 A2 19960606
US 1996-683869 A2 19960719
US 1998-190374 A3 19981112
US 1999-435401 A3 19991105

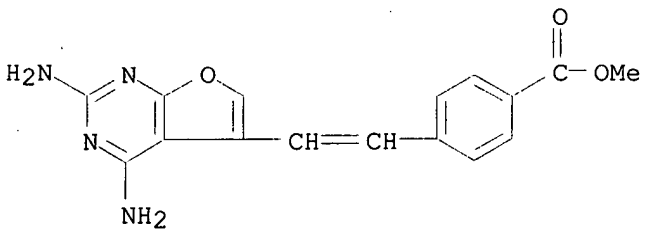
OTHER SOURCE(S): MARPAT 130:218324

AB Pyrimidine compds., and pharmaceutically acceptable salts thereof, are disclosed which are useful in therapeutically and/or prophylactically treating patients with an illness. Such illnesses include cancer and secondary infections caused by Pneumocystis carinii and Toxoplasmosis gondii in immunocompromised patients. The compds. themselves, methods of making these compds., and methods of using these compds. are all disclosed.

IT **169783-32-8P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(prepn. and reaction; pyrimidine deriv. prepn. and therapeutic use)

RN 169783-32-8 HCAPLUS

CN Benzoic acid, 4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethenyl]-, methyl ester (9CI) (CA INDEX NAME)



REFERENCE COUNT: 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L17 ANSWER 6 OF 6 HCAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 1995:817810 HCAPLUS

DOCUMENT NUMBER: 123:275210

TITLE: Effect of bridge region variation on antifolate and antitumor activity of classical 5-substituted 2,4-diaminofuro[2,3-d]pyrimidines

AUTHOR(S): Gangjee, Aleem; Devraj, Rajesh; McGuire, John J.; Kisliuk, Roy L.

CORPORATE SOURCE: Graduate School Pharmaceutical Sciences, Duquesne University, Pittsburgh, PA, 15282, USA

SOURCE: Journal of Medicinal Chemistry (1995), 38(19),

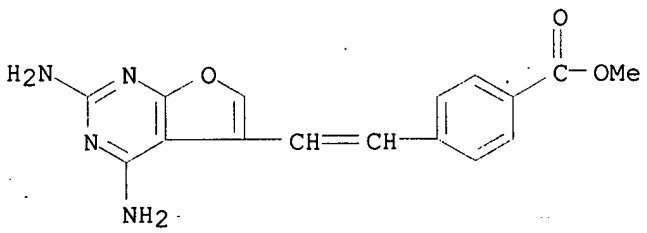
3798-805
CODEN: JMCMAR; ISSN: 0022-2623
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Variation of the bridge linking the heterocyclic ring and p-aminobenzoyl-L-glutamate portions of the authors previously described classical 2,4-diaminofuro[2,3-d]pyrimidines are reported as inhibitors of dihydrofolate reductase (DHFR) and thymidylate synthase (TS) and as antitumor agents. Specifically -CH2CH2- and -CH2NHCH2- bridged analogs, N-[4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethyl]benzoyl]-L-glutamic acid (I) and N-[4-[[N-[(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)methyl]amino]methyl]benzoyl]-L-glutamic acid (II), resp., were synthesized. I was obtained via a Wittig reaction of the tributylphosphonium salt of 2,4-diamino-5-(chloromethyl)furo[2,3-d]pyrimidine and Me 4-formylbenzoate followed by redn. and coupling with the di-Et ester of L-glutamic acid. II was synthesized by the nucleophilic displacement of 2,4-diamino-5-(chloromethyl)furo[2,3-d]pyrimidine with di-Et N-[4-(aminomethyl)benzoyl]-L-glutamate and sapon. Both analogs were evaluated in vitro as inhibitors of DHFRs from (recombinant) human, human CCRF-CEM cells, and Lactobacillus casei. I showed moderate activity (IC50 10-6-10-7 M). II was essentially inactive (IC50 10-5 M, CCRF-CEM). The compds. were also evaluated against TS from (recombinant) human and L. casei and were of low activity (IC50 10-7 M) while II showed a low level of growth inhibitory activity. The inhibition of the growth of leukemia CCRF-CEM cells by both compds. parallels their inhibition of CCRF-CEM DHFR. I was a good substrate for human folylpolyglutamate synthetase (FPGS) derived from CCRF-CEM cells (Km 8.5 .mu.M). Further evaluation of the growth inhibitory activity of I against the methotrexate-resistant subline of CCRF-CEM calls (R30dm) with decreased FPGS indicated that poly-.gamma.-glutamylation was important for its action. Protection studies with I in the FaDu squamous cell carcinoma cell line indicated that inhibition was completely reversed by leucovorin [(6R,S)-5-formyltetrahydrofolate] or by a combination of thymidine and hypoxanthine, suggesting an antifolate effect directed at DHFR.

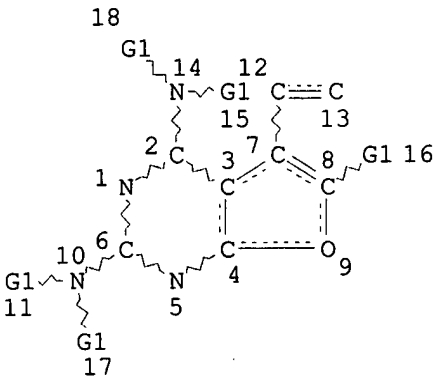
IT **169783-32-8P**
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(effect of bridge region variation on antifolate and antitumor activity in human cells of classical 5-substituted diaminofuro[d]pyrimidines)

RN 169783-32-8 HCAPLUS

CN Benzoic acid, 4-[2-(2,4-diaminofuro[2,3-d]pyrimidin-5-yl)ethenyl]-, methyl ester (9CI) (CA INDEX NAME)



```
=> d que stat
L14              STR
```




```
VAR G1=H/CH3
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS  18

STEREO ATTRIBUTES: NONE
L16            8 SEA FILE=REGISTRY SSS FUL L14
L17            6 SEA FILE=HCAPLUS ABB=ON  L16
```

=> d his

FILE 'REGISTRY' ENTERED AT 17:46:00 ON 06 MAY 2003
L14 STR
L15 0 S L14
L16 8 S L14 FULL 8 compds from Registry - see dquestat

FILE 'HCAPLUS' ENTERED AT 17:50:02 ON 06 MAY 2003
L17 6 S L16 6 cit's from CA Plus